

Patent claims

1. Pyrogenically prepared, doped zinc oxide powder, wherein the doping component comprises at least one oxide from the group of the elements aluminium, gallium, indium, germanium, tin, silicon, characterised in that the doped zinc oxide powder is in the form of aggregates having a mean maximum diameter of from 30 to 300 nm, and the doping component is present in an amount of from 0.005 to 15 wt.%.
- 5 2. Zinc oxide powder according to claim 1, characterised in that the mean maximum aggregate diameter has a value of preferably from 50 to 400 nm, particularly preferably from 80 to 200 nm.
- 10 3. Zinc oxide powder according to claim 1 or 2, characterised in that the aggregates have a largely anisotropic structure, defined by a form factor $F(\text{circle})$ of less than 0.5.
- 15 4. Zinc oxide powder according to claims 1 to 3, characterised in that the mean primary particle diameter is from 5 to 30 nm.
- 20 5. Zinc oxide powder according to claims 1 to 4, characterised in that the BET surface area is from 5 to 100 m^2/g .
- 25 6. Zinc oxide powder according to claims 1 to 5, characterised in that it has a resistivity of not more than $10^5 \text{ Ohm} \times \text{cm}$.
7. Zinc oxide powder according to claims 1 to 6, characterised in that it has a transmission of at least 70 %.
- 30 8. Zinc oxide powder according to claims 1 to 7, characterised in that the amount of doping component is preferably from 0.2 to 6.0 wt.%.

9. zinc oxide powder according to claims 1 to 8,
characterised in that the doping component is aluminium
oxide.

10. zinc oxide powder according to claims 1 to 8,
5 characterised in that the doping component is a mixture
of indium oxide and tin oxide.

11. Process for the preparation of the zinc oxide powder
according to claims 1 to 10, characterised in that it
is obtained in four successive zones, a vaporisation
10 zone, a nucleation zone, an oxidation zone and a
quenching zone, from zinc powder and at least one
doping agent,

wherein, in the vaporisation zone, zinc powder is
vaporised in a flame of air and/or oxygen and a
15 combustion gas, with the proviso that the reaction
parameters are so chosen that oxidation of the zinc
does not occur,

and wherein, in the nucleation zone, into which there
passes the hot reaction mixture from the vaporisation
20 zone, consisting of zinc vapour, water vapour as the
reaction product of the flame reaction, and optionally
excess combustion gas, is cooled to temperatures of
from 500 to 900°C or is cooled by means of an inert gas,
and an aerosol containing at least one doping agent is
25 fed in in an amount that corresponds to the desired
amount of the doping agent in the zinc oxide powder,
and wherein, in the oxidation zone, the mixture from
the nucleation zone is oxidised with air and/or oxygen,
and wherein, in the quenching zone, the oxidation
30 mixture is cooled to temperatures of less than 400°C by
the addition of cooling gas.

12. Process according to claim 11, characterised in that
there is fed to the nucleation zone, instead of an
aerosol, at least one doping agent in vaporised form.

13. Process according to claims 11 or 12, characterised in that an excess of combustion gas, expressed in lambda values of from 0.5 to 0.99, is used in the vaporisation of zinc powder and doping agents.
- 5 14. Process according to claims 11 to 13, characterised in that the temperature in the nucleation zone is preferably from 700°C to 800°C.
- 10 15. Process according to claims 11 to 14, characterised in that the rate of cooling is preferably from 100 K/s to 10,000 K/s in the nucleation zone and preferably from 1000 K/s to 50,000 K/s in the quenching zone.
- 15 16. Process according to claims 11 to 15, characterised in that the dwell time is preferably from 0.1 s to 4 s in the vaporisation zone, preferably from 0.05 s to 1.00 s in the nucleation zone, preferably from 0.05 s to 1.00 s in the quenching zone, and preferably from 5 ms to 200 ms in the oxidation zone.
- 20 17. Process according to claims 11 to 16, characterised in that halides, nitrates, alkyls, alkoxides and/or mixtures thereof are used as the doping agents.
18. Use of the zinc oxide powder according to claims 1 to 10 in electrically conductive, optionally transparent lacquers and coatings, as a filler, in sun protection formulations.